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MANAGEMENT

# of INCUBATORS

and REARERS

BY

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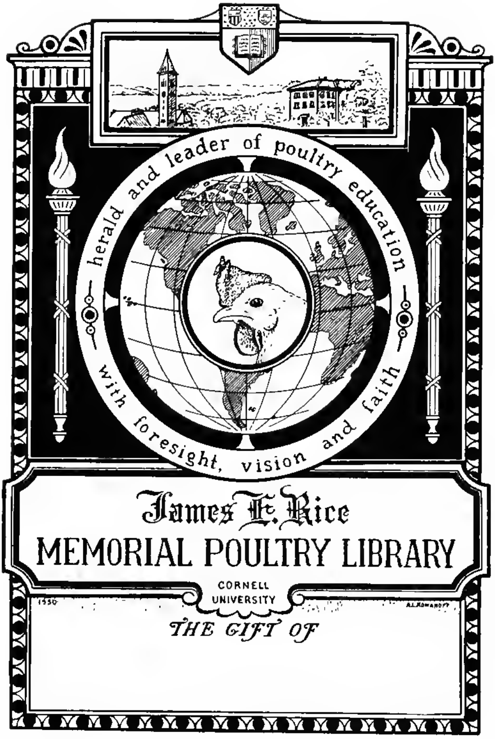
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Management of Incubators.

By P. Proud.

Scarcely a week passes during the earlier months of the breeding season that I do not receive, in the increasing number of queries, many letters from young fanciers telling of their failure in the management of incubators. Our Editor has suggested to me that some notes on this subject would be of help to those who have hitherto failed to hatch successfully by artificial incubation. There never was a time when more incubators were used than at the present day, or when really reliable machines could be bought at such reasonable prices. A few years ago it would have been an impossibility to purchase a thoroughly reliable machine, of a 50-egg size, for less than £5 or £6; yet to-day such machines can be bought at a little more than £3. There are incubators and incubators; some are good, and others good for nothing. But it is not always the machine that is at fault; in many cases it is either the fault of the management, or the unsuitable accommodation for the proper working of the incubator—sometimes both are at fault.

In considering the question of incubators and their management, it naturally follows that we shall have to look over the method of construction and materials employed, in order that we may be able to remedy any little defect, or make them more suitable for the accommodation at our disposal. To begin with the ever popular British tank machine, it will be as well to see how and of what the tank is made. Large tanks and small tanks each have their advocates, and those who claim superiority for their large tanks advance the theory that, when once this large volume of water is heated to the correct temperature, it will not greatly vary from the degree of heat attained, and it is so. But it cuts both ways, and when a sudden fall in the temperature of the room occurs, the damper falls on the chimney-top, and the temperature rises within the tank. I have found it as high as 140 degrees in cold weather, and as low as 110 degrees in warm weather. Having attained the heat of 140 degrees the weather suddenly "takes up" and becomes much warmer. "Well," you say, "the damper rises and allows the water in the tank to cool." So it does, *but not quickly enough*. The larger body of water takes *longer* to cool, so that the extra heat is prolonged and dangerous. The real purpose of the tank is to provide an equal distribution of heat over the eggs in the drawer, and to act in a manner as a fly-wheel in steadying the drawer temperature. The small tanks in cheap machines do not hold sufficient water to effect this purpose, and these machines vary considerably, as the more rapid transition

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of heat from flues to water does not give the capsule a chance to control the drawer temperature. These machines (shallow tank) are like the tide, always rising or falling, and the amateur who attempts to regulate them will be in pretty good "training" by the time he has run off the first batch of eggs, particularly if the machine happens to be situated in one of the upper rooms of the house. It is impossible to get the temperature stationary in such a machine, so that one with a moderate-sized tank is to be preferred. One would hardly think of purchasing a machine with any other than a copper tank, although others are offered for sale. So long as the copper is of sufficient strength to hold the water without "bagging," this is all that is necessary, and up to this point the thinner the better. Good makers often make the flues of still thinner materials, and rightly so, as the heat from the lamp is the more readily imparted to the water, and the machine more sensitive to capsule influences. Buyers, however, should insist on "all over" copper tanks, as many are sold with tin tops, which soon leak and cause disaster, and make the buyer wish he had added the price of the eggs spoilt to the price of the poor machine, and bought a good one to begin with. Many amateurs wonder why the bottom of the tank is blackened, and think that if it were bright the heat coming from it would be greater, but this is not so. If the heat were opposite the brightened surface this would be so, but not when it is behind it. Blackening the tank bottom, on the other hand, causes radiation in this case, and I need hardly say this is the most reliable and economical method of heating, for now the eggs receive the heat the same way as the earth receives the sun's rays, whereas the intervening air may be several degrees cooler. By blackening the tank then, the eggs receive radiated heat, and are not so subject to draughts as they would be in the other case.

Most of the tank machines are regulated by a capsule, and choice should be given to one that has as little iron as possible in the tripod that goes to form the base for the capsule. In some cases the whole of the base for the capsule is iron or brass—a very bad plan, as the heat is conducted from the tank down the arms to the base plate, and so to the capsule, the result being that the damper is kept off the chimney-top long after the drawer temperature has fallen. On the whole, the stirrup fillings and pegged capsules seem to answer the best. The intervening space between tank and case is all the better if packed with mineral wool, fur, or wadding, as heat travels in straight lines. By the use of such substances the lines are broken, and hence do not conduct the heat away to the case, to be parted with again to the surrounding atmosphere. Most hot-air machines are so packed, and that class of machine that has a hot-air tank similar to the water-tank, or where the hot air is first accumulated and then passed through a woollen diaphragm, seem to give the best results, but I cannot recommend machines where the products of combustion are turned into the egg-chamber.

The incubator room should be as good a one as can possibly be provided. An outhouse will not do. A well-ventilated cellar, or a cellar kitchen which is half above the ground, is perhaps the best room of all. A bedroom with a north window often makes a good room for the purpose, but any room that is used where the sun shines in should have a dark blind to the window to render the temperature more equable. The machine should be staged at a convenient height, on good, firm benching, and should itself be at least 6 inches from the wall, for if in contact with an outer wall of the room the machine will lose heat on that side of the machine, and the eggs on that side be lower in temperature than the others. This fact alone often accounts for a poor hatch, for the machine is placed right back against the wall, and the thermometer is on the opposite side. Who can say, then, whether the eggs farthest from the thermometer are receiving sufficient heat? When you find chicks hatching out late, you should see whether some such leakage is not taking place. Supposing that you have not started your machine in a proper manner first, the next thing is to see that the machine is level, and you cannot be too particular in this respect. If one corner is lower than the other, the temperature will vary, and the eggs in either the lower or higher corner be over or under heated, and, as the eggs are usually changed from place to place in the drawer, each in turn will be over or under heated, and the average of the whole hatch spoiled.

Having mounted the machine, the next thing is to adjust the fittings. The stirrup must be screwed to the tube that reaches through the bottom of the tank, the capsule placed on this, and the lifting-rod dropped through the tube from the top of the machine. See that the lifting-rod is right in the centre of the capsule, insert the lever arm, on which is the lead weight, into the socket, hang on the damper. See that the bottom of the milled-head screw rests on the top of the lifting-rod, and turn this screw until the damper just rests on the top of the chimney. The tank may now be filled. Water heated to a temperature of 110 degrees should be used, and the correct temperature will be all the sooner obtained. The lamp will now have to be filled with the best oil, lit, and turned half up, and placed in the machine. Put in the water tray and fillings, close the drawer, and leave the machine for an hour or so. On going back, note whether the temperature has risen; if not, turn on a little more flame, and leave the machine for five or six hours. By this time the capsule will have lifted the damper off the chimney, and as the right temperature has not yet been attained, the lead weight, which until now has been as near to the lifting-rod as it would go, should be moved an inch at a time, until the correct temperature of 102 degrees (it will rise to 103 degrees when eggs are in) is maintained, and it should stand steady at this heat all night before putting in the eggs. Do not, however, turn the lamp up any higher than necessary; so long as the damper is off the chimney-top at 102 degrees, and raised about an eighth of an inch, it is right. If the damper is higher than this, then too much lamp-heat is being used; if less, than not enough lamp-heat is being used to allow for a sudden fall in the room temperature. This simple precaution is often neglected, and is one of the secrets of successful artificial incubation.

The correct temperature of the egg-drawer is a vexed question, but need not be so, for it all hinges on the position of the thermometer. In the most successful machines of the present day the bulb of the thermometer reaches to about the second row of eggs in the egg-drawer, and is about an eighth of an inch above the nearest egg. In such a position a drawer temperature of 103 degrees is found to give the best results. This again is governed by the outside temperature of the room, and whether the temperature falls to 40 degrees or less, a little more heat will be required; but I should not care to operate a machine in any room where the temperature fell below this point. With the thermometer in the position named, it will not be necessary to run the machine at a heat above 104 degrees in a cold room, or less than 102 degrees in a warm room, say one 70 degrees or more. In the case of a machine where the thermometer reaches to the centre of the egg-drawer, or nearly so, and is itself, owing to the concave egg-drawer some 1 inch to 1¼ inches above the eggs themselves, it may be necessary, to operate at 106 degrees in a cold room of about 40 degrees. After all, it is the eggs themselves that have to be kept at a uniform temperature. As nearly all makers advise a different degree of heat, from 102 degrees to 106 degrees, the problem is a perplexing one to the novice; but, having read the above notes, he will be in a position to decide for himself, or check the maker's instructions. No doubt he will also come to the conclusion that it will be better to place the bulb of the thermometer on an egg, and a good many experts do; but it is not a safe plan for the majority, for in such a case it is absolutely necessary that the thermometer rest on a fertile egg; then the embryo may die at any time, and the machine altered to the reading of the thermometer on the dead germ, and so the whole regulation upset. Far better to locate the thermometer in the place indicated in this article, and all doubts will be at an end.

So much depends on the thermometer that it is most important that it should be tested before commencing operations. It can be tested by comparison with a good clinical, placing both in the same bowl of water heated to about 103 degrees; or it may be placed under the tongue, and the reading noted in a mirror, unless a friend is at hand to read it for you. If a temperature of 98 degrees to 99 degrees is shown, you may regard it as being correct enough for all practical purposes.

Turning and cooling the eggs will next engage attention. Why turn, or why cool? Naturally the eggs are turned by the hen, and we must follow nature in this respect for the following reason:—

The germ rests on the uppermost side of the yolk, and if left too long in this position will press aside the intervening layer of thick albumen, and eventually adhere to the shell. More than this, the chicken is mainly built up from the white, and a change in position causes a fresh supply of albumen to come in contact with the yolk and its network of blood vessels. If an egg is allowed to remain in one position the contents separate, the albumen and yolk floating on the more watery portion of the egg, and when the spreading blood vessels reach the water, they cannot get further, and the growth of the embryo is arrested. These vessels often terminate in a straight line, leaving a blood-like streak along the inner side of the shell, clearly visible through the egg-tester. It is most desirable that the blood vessels should spread themselves as evenly as possible over the entire inner portion of the shell, so that the requisite amount of lime necessary for the skeleton of the chick may be absorbed from the shell, and utilised in building up the frame of the embryo. Again, the shell being now somewhat thinner, a larger supply of oxygen can be absorbed by the blood vessels through the shell, and a strong vigorous chicken be produced. Let me here state that the chick is made of neither the yolk nor the white, but both yolk and white feed the germ which is deposited in a fertile egg before it is made inside the hen. Readers will now see the importance of turning the eggs, and this is better done at regular intervals. Turning every twelve hours gives the best results, but whenever you turn and cool the eggs, let it be at one stated time each day if you wish for perfect regulation of your machine. If you prolong the period between when you should cool the eggs, the machine *gains* in heat, but if you turn before the accustomed time, you lose in heat.

Cooling is a matter of great importance. Some swear by lengthened periods, because at some odd time (generally in the summer) they have left the drawer open an indefinite period and good results followed. The majority of operators are also often led away by the reports of experimental stations. Nearly all these places advocate prolonged cooling, that is, from 30 minutes to 45 minutes, and with them it succeeds; so the incubator user naturally thinks it will succeed with him. He does not take into comparison the difference in the room where some thirty to a hundred machines are running against his own, perhaps containing only one or two. At all the experimental stations I have visited, and all large farms, where large numbers of incubators are used, I have always found a very high room temperature, in some cases even 90 degrees being reached, whilst in others 75 degrees, and this room rarely fell more than 10 degrees in temperature at any time. This room temperature makes all the difference as to the amount of cooling that will be required. In a room that only registered 40 degrees it would be folly to cool down the eggs some 30 minutes. In average conditions, and the room temperature between 50 degrees and 60 degrees, a cooling of five minutes the first week, 10 the second, and 15 the third has been found most satisfactory, and beyond this time it is rarely necessary to go. In a room 70 degrees some 20 minutes may be allowed, but in a room 40 degrees the time occupied in turning the eggs will be long enough. There is, however, one simple way out of the difficulty, and as many incubator users have not a room thermometer, the advice will be useful to them, and that is, turn your eggs, replace the thermometer, and partly close the drawer of your machine; cool down until your thermometer shows anything between 70 degrees and 80 degrees, then close the drawer. This is a very safe guide as to the amount of cooling required. In hot-air machines cooling may be conducted in much the same way, and the eggs turned, and the egg trays also turned end to end, or side to side, if there be two. This is very necessary in this class of machine, for the air outlet is usually on one side of the machine, and the evaporation on that side of the machine greater than the other. You cannot put trust in the beautiful system of ventilation shown by arrows in the maker's catalogue, and if you change the egg-drawers from side to side things will be evened up a bit.

In both classes of machine I think it better to trim, or at any rate fill, the lamps at night, as the wick has not the same distance to suck up the oil, and consequently full pressure is maintained during the coldest portion of the twenty-four hours, for by morning the oil will have carbonised on the wick and left a slight crust, with a resultingly smaller flame, but still all that is necessary for the warmer daytime.

I have found much better results to accrue from not using any water in the moisture pan for the first ten days, although these fittings should be placed in the machine from the first. After ten days, half fill the tray with water heated to quite 80 degrees, and replenish the supply from time to time as may be necessary. Good, strong, fertile eggs are now only required, and we can start our machine. Only the best of eggs should be selected, and those free from any roughness of shell or uneven in any way. The best-shaped and smoothest-shelled are the best, and, in trying for a record hatch, they should be as even in size as possible. A few of these are carefully laid in the centre of the egg drawer, and the others "built up" round them. If you start to put them in anywhere else, they only roll to the centre, and come together with a crash. Having filled and closed the drawer, leave the eggs for twenty-four hours before they receive their first turning, and after this twice daily. There is no need to cover the eggs with marks that will only be in the way at testing-time; so long as each egg is turned a little nothing more is needed. Indeed, I think some of the advantages of turning the eggs are lost by periodically returning one portion of the egg to the same spot every twenty four hours. Dead in shell will occur even in the best managed machines, but should not be in excess of the average failures from eggs hatched under hens. Why, I am not going to attempt to explain. In the case of all seed, whether of plant or animal, the waste is enormous, compared with the fruit that arrives at maturity, and I think we get quite as good an average from our poultry. The better you manage your stock the better the result, but, for all that, there are unaccountable failures.

The chicks should be removed from the egg drawer every four hours, and at such times turn up the lamp a little to compensate for the loss of heat; otherwise those left in a half-hatched state will perish from lack of heat at this very critical time with them. After being removed from the egg drawer to the drying box, they should not be allowed to remain in the latter for more than twelve hours at the outside, or many of them will succumb to the various forms of cramp and leg weakness, and an early disposition to liver trouble will be fostered.

So far nothing has been said concerning duck eggs; for this reason—we did not wish for any confusion to arise in considering the temperature. Duck eggs should always be hatched at a lower temperature than hens' eggs. One hundred and two degrees may be regarded as the highest temperature to be employed; indeed, at one of the large duck farms, where over 30,000 are artificially hatched, the temperature is nearer 100 degrees than 102 degrees for the greater part of the time, but then the room temperature is a high one of from 80 degrees to 90 degrees, and this makes all the difference. It is a popular mistake to imagine that the duck being an aquatic bird, their eggs will require more moisture, but, apart from the moisture supplied in the machine, very little extra moisture is needed, except, perhaps, on a very hot summer day, when on the last day of incubation, they may be sprinkled with tepid water or a flannel wrung out in tepid water and laid over them for a minute or two. This latter process is much in use at the above-mentioned establishment. Duck eggs, of course, require the same airing as hen eggs, but the period of incubation is much longer, being twenty-eight days, against twenty-one days of the ordinary hen eggs. Again, the period of hatching out, after the duck egg is chipped, is much longer than in the case of hens' eggs, and, in consequence, many young fanciers make a great mistake in liberating the duckling before its proper time.

Management of "Rearers" or "Foster-Mothers."

If the advice given in the "Management of Incubators" has been closely followed, a fine brood of chicks should be ready to leave the drying-box for their new home in the rearer. The management of a rearer requires quite as much skill as that of an incubator, but, once acquired, it becomes second nature, in more than one sense of the word. There is an immense variety of brooders and rearers on the market. Many are a mere libel on their name, as the only thing they can rear is "roup" colds, and diarrhœa from colds.

When purchasing a rearer, a good deal of attention should be paid to the sleeping compartment, and it should be noted that the lamp is sufficiently powerful to keep up the required temperature in winter, as well as in summer. A great many fail in this respect, and when the lamp is turned up in an endeavour to increase the heat, very often it "fires" or explodes, with disastrous results. Many rearers are heated by a tank, covering all or part of the sleeping compartment. Preference, however, should be given to that type of brooder in which this tank only covers part of the sleeping chamber. Where the tank extends all over, the atmosphere is too close, but at the same time this tank should be sufficiently high, so that the chicks cannot touch it with their heads during the first two weeks of their existence. Before passing on to the consideration of the hot air brooder, let me say that you should always avoid brooders that have a quantity of flannel curtains to keep up the temperature, as these are a prolific cause of disease, for they are rarely cleansed as often or as thoroughly as they should be. Some people think they are following nature by having a kind of hearth-rug, with flannel strips hanging down, or sheepskin, for the chicks to nestle under, but these things do more harm than good. If the correct temperature is always maintained in the brooder the chicks will never exhibit any desire to "nestle." I do not condemn the small strip of flannel that is often used to guard the doorway of the sleeping apartment, but this should be frequently renewed and the old one burnt. A great many brooders of the present day are heated by a lamp in the sleeping chamber itself. In such cases it is important to use a specially constructed burner, the ordinary table lamp burners not being safe for brooders. A "storm lamp," or hurricane lantern, is a very safe type of lamp to use. Some few rearers that have merely an ordinary table lamp are highly dangerous, as the dust the chicks raise, and fluff, soon cause them to smoke and fire. Often with this class of rearer there is a great difficulty to maintain the temperature in winter time. A good thick sack over the ceiling, or radiator, will make many degrees difference in the temperature of the compartment, and, being over the radiator, and not actually in the compartment itself, there is no objection to its use, as the chicks are never in contact with it. In these days one would hardly think of purchasing a rearer that supplied heat to the chicken's feet—a prolific source of leg-weakness and liver trouble. Heat radiated on the backs of the chicks is by far the best plan, as the lungs of the bird lie close to the back, and the whole of the blood passing through them every few minutes is quickly warmed and the chick made comfortable. With all types of brooders it is very necessary to have a well-lighted compartment adjoining the sleeping chamber, as the contrast from heat to cold is not so rapid, and the compartment is most useful on cold wet days, as the chicks can be fed in it and kept dry and comfortable.

Ever since the time when chicks were first reared artificially, the question of floors and floor covering has indeed been a vexed one. The outcome of much time, trouble, and loss spent in various experiments is that the sleeping compartment should always be boards, and in damp situations the shed adjoining also. It is better if this floor be made removable, as there are many places where it can be done without entirely. All kinds of materials have been tried as floor coverings with varying results.—sawdust, bran, peat moss, chaff, and chopped hay, dry earth and sand. By far the best results have been attained both in brooders and brooder houses, where the bedding consisted solely of dry sand or earth. Sand is to be preferred whenever it can be used. No good comes of bedding the sleeping chamber two or three inches deep with it. So long as the floor is covered all over nicely, it is all that is necessary, and the whole sand and manure can then be readily removed daily. If left longer it only creates a sickly odour, which disgusts the owner, and is very injurious to the health of the chicks. Sawdust in the brooders sooner or later leads to liver trouble, as the chicks pick up the white particles, as they always do anything white, under their feet.

The brooder should be situated in the best sheltered and most sunny spot that can be found, but never in a stable or on a cement or boarded floor, about which more will be said presently. It is a mistaken kindness to choose such situations. Given the correct temperature in the brooder, and a nice dry shed for shelter, it is surprising the amount of cold even very little chicks can endure. Choose a spot that is sheltered from the wind as much as possible, behind a good thick hedge, or on the sunny side of a bank or wall, for the more natural the shelter, the more the chicks will stay out and grow, and thrive.

Before going on to the operation of a brooder, we must consider its size, and one to accommodate thirty to forty chicks is quite large enough, as fifty at the outside should be reared together. Although the sleeping compartment may appear a wilderness with some forty to fifty chicks in, you must consider how much of it they will occupy when they are three weeks to a month old, unless you have a larger rearer to take them. To rear forty chicks to a month old not less than 2 feet square of floor space should be allowed.

We now come to the most important point in artificial chicken rearing, and that is the correct temperature. If too little heat is given the chicks will rarely emerge from their sleeping chamber, where they will be huddled together, chirping discontentedly, and will have to be "hauled" out to get them to feed. The temperature should be quite 90 degrees, or even a little over, the day the chicks are removed, in a snug, well-lined basket, from machine to rearer. There is nothing like giving them a good start. For the first three days, or even longer in bad weather, 90 degrees should be maintained in the brooder, and gradually reduced to 80 degrees at the end of a week or ten days. This should gradually be reduced to 70 degrees by the end of the third week. In the early part of the season it may be necessary to keep up this heat for another couple of weeks, and then reduce to 60 degrees, when they can be gradually cooled off, until they only have a little heat at night, and finally do without it. There are, however, certain signs by which you can determine whether the chicks are getting enough heat or not. After the first day, I seldom use a thermometer. If the chickens, when in the sleeping apartment, lie about with their heads on the floor and mouths open, you may know that too much heat is being given, whatever heat may be shown on the thermometer. On the other hand, should they be huddled together in the corner farthest away from the door, too little heat is being given. Another sign is, when they are warm enough, they will come out readily to feed, and be popping in and out all day long whilst, if too cold, you will only see them occasionally, as they will spend all the time they can in the under-heated chamber. Both over-heat or a chill may produce diarrhœa, and should be carefully guarded against. It is always a good plan to visit the rearer about 10 p.m., taking the greatest care not to make any noise or touch the rearer, and so get a glimpse of the chicks, and observe what attitude they are in. Having been shut in for some four hours or so, the temperature may have gone up, and you can make the needed alteration, and, if you like, give the little birds a feed by lantern light. If you touch the rearer, they will start up in a second, and their position then is no criterion as to the temperature of the brooder. When the right heat is attained, you will have no trouble in rearing the chicks. They will run in and out all day long, and chase the falling snowflakes if allowed, with no thought of cold, and retire to bed, uttering that contented chirp that they do when settled under a hen, and in a few minutes no sound will be heard. When a shrill "Peep peep!" is heard at night, when you are about the yards, you may take it that they are too cold, or that one particular one is ailing, and I have known a manager for a well-known exhibitor of the present day watch for an hour or two at night to discover the chick uttering this discontented cry, and, when found, it is speedily despatched and not left to disturb the rest of the healthy chicks. I can only commend his wisdom in aiding the law of the "survival of the fittest." Hundreds of chicks perish every year from underheating, and, whilst guarding against this, do not run to the other extreme.

If your land is dry, do not have any floor in the day shelter. Simply allow the chickens to step on to the natural earth from their sleeping chamber. The more that is written against boarded floors and cramp, the more people seem to use such floors, and the chicks suffer from leg troubles. Last season I answered scores of queries and letters about cramp and leg-weakness, and, no doubt, in spite of the present pamphlet, will have to do so again. To many, a stable or a room, with a wooden or cement floor, seems to be an ideal place for chicken rearing, and I have heard several disconsolately remark they could not rear early chickens, because they had not such places to keep the chicks in. Give them a pigstye or a "loft," stable or shippon, wherein the sun never shines, and they are happy, and think they have all that is needed for successful chicken rearing. They never made a greater mistake. Such places and greenhouses are fatal. It is simply impossible to keep chicks beyond a few days in them, however thickly they may be bedded with earth. Why, I cannot tell you; but you know that there is a law in nature that so soon as an organ is no longer necessary, at such a time it will become atrophied and obsolete. There is little doubt but that the chicks' legs and feet from birth are supplied with all the heat and oily secretions they need to combat against the wet and cold ground. By not allowing the chicks to come in contact with mother earth, these organs become useless, and not only so, but they prevent the full measure of nutriment coming to these parts, and leg weakness, inability to stand except on hocks, cramp, and other evils follow. In a larger way you have noticed how rapidly the leg colour of a fowl becomes paler when confined to boarded floor, and how it recovers when sent out again on to a grass run, or allowed to sit on what is bound to be more or less a damp nest. I only mention this to show clearly the connection between the loss of colour in the adult and power in the young when connected with a wooden floor, and the cure when normal positions are restored. You naturally say, "What about the tiled floor?" If you kept your adult on a damp tiled floor it would get cramp or rheumatism; the same with the chickens. Cramp and leg weakness are two things not to be confounded or cured by the same remedy.

Brooder chickens are differently situated to those with the hen with regard to their supply of moisture or drinking water, and whilst those with the hen obtain a considerable amount from the dew on the grass, those in the rearer cannot obtain so much.

owing to their dry surroundings. Whenever possible, the rearer should be placed on the grass, but even then a fair supply of milk or water should be allowed in the morning, and again at night. When the brooder is placed on sand or earth, and little green food near the rearer, then they may require a few sips during the day. A great deal depends on the season of the year, and whether "dry" or soft feeding is resorted to. Strange as it may seem, in "dry" feeding water must always remain by them, for if, through neglect, their fountain is allowed to remain dry, they will promptly drink themselves to death on the first opportunity. I was called in to such a case, but, unfortunately, too late, and only five out of a brood of over forty lived. In this case their fountain had not been filled at daybreak, and by eleven, when this defect was remedied, they simply drank till they rolled over and died by the fountain. Had they been allowed to drink only a few drops of warm water or milk at hourly intervals, the result would have been very different. You will undoubtedly think I am a believer in the "no water" theory, but if you refer to "Chicken Management" as a guide for your menu, you will find that I recommend water in its purest form and as naturally obtained from the dew on the grass, and in milk sop meat, and bulky vegetable food, all of which contain large quantities of pure water.

In managing a brooder, it is very important to have the chicks all one size—that is, do not add chicks to the brooder every week. Such a plan never answers, and more than this, do not make the brooder a hospital for all the sickly and trampled-on chickens you can collect together from the hen coops. Give the rearer a chance. Many a brood is reared without the loss of a single chick, if ordinary precautions are taken. I remember being called in to investigate the excessive mortality amongst chickens on a gentleman's private poultry farm. I was met by the poultryman at the station, who gravely informed me how many he had "raked" out of the rearer that morning —a regular Spion Kop!—and he confidently asserted that there would be "another nice crop for me to see," and so there was. In that rearer there were chickens from a day old to five weeks, and all the cripples and ailing chicks from under the hens were dumped in, and it is in the "dumping" that the cause of the mortality lay. It did not take long to inform him that the whole of his trouble was "lice," which he thought was a grave error of judgment on my part. "Rearer chickens," he said, "should never have lice." Quite right; but on showing him five different specimens on the corpse of a day-old chick that a five-week-old specimen had been using for a footstool, he said he could not understand it. I pointed out that they would not have lice unless they were given to them. That is the ill that follows transferring chicks from hen to rearer, and often an unsuspected cause of disaster.

Brooder houses are not yet common in this country, so that little need be said of them. They have their advantages. On the other hand, if anything goes wrong the trouble is magnified, and goes through the whole lot. The principles are, however, much the same—an adequate temperature and suitable feeding, and a run out on to the earth or grass being quite as essential in one case as the other. In the case of brooders or brooder houses, the compartments should be limewashed before being occupied by each fresh batch of chicks. Chickens reared artificially do not require quite so much animal food, particularly during the first fortnight of their lives, and should be fed at all times very sparingly to encourage them to run about as much as possible. When hatched and reared by hens, they are bound to take more exercise, and consequently more food. By feeding the brooder chicks sparingly, you will not lose size. If you start two lots off at the same time, one naturally and one artificially, there will be very little difference in the sizes of them at a month old. The great advantage of a brooder is, you have only one brooder to attend, against four or five coops with broody hens, so that one can manage a much larger number than otherwise. The management once properly learned, the work is a pleasurable and most fascinating one, especially to ladies, and it is not surprising that they are, as a rule, the most successful users of brooders.

"Little and often" should be the golden rule in feeding rearer chicks. They should never be allowed to go and fill their crops early in the day, although by night they will, if healthy, have accumulated a rare cropful of food to sustain them during the long hours of the night, and any chick that retires with little or nothing in its crop should be looked upon with suspicion. It is highly important that green food should be given from the first, even when on a grass plot. They seem to do better if some form of green food is chopped up or cut into fine chaff, and sprinkled over their food-trough or board. The *regular* use of this class of food is a great preventative of bowel troubles. Some very successful rearers I know pass all the green food through one of the mincing machines (which are retailed at about 5s. 6d. at most ironmongers), and add a portion of this finely-cut green food to each meal. On earth runs this plan answers excellently, and chickens so fed are quite equal to those on a grass run in point of health. Many cases of bowel trouble and "stuck up behind," of which we hear so much, may be traced either to the spasmodic giving of green or animal food, or a chill following either over or under heat in the rearer. Where this bowel trouble exists I have generally found that if the feeding has been correct, the temperature of the brooder has been, on the whole, a shade too low. The best method of feeding has already been given in "Chicken Management," and those new readers who did not peruse this article when it appeared in these columns can obtain it for 3½d. To it little need be added, except that rearer chickens should have a good depth of litter over the sand. Chopped straw is the best, run through a hay-cutter, as the chickens cannot swallow any of these pieces as they can short hay or chaff, which their weak digestive organs cannot dispose of, and which remains in an undigestible ball in their crops. In this clean cut straw a little small grain should be sprinkled two or three times a day, and the chicks will scratch it out in a surprisingly vigorous manner. Millet, canary, or broken groats and wheat are all good, or one of the "dry feed mixtures" may be used. It is the abuse, and not the use, of this latter article that causes the trouble. For the rest of the menu and symptoms and treatment of chicken ailments I must refer my readers to the pamphlet mentioned on "Chicken Management," post free 3½d. from the Office of *The Feathered World*, which, with the notes here given on the management of both the incubator and the rearer, will enable the young fancier to rear his chicks successfully from the shell to maturity. Should the novice, however, be in any difficulty, a letter to the Editor of *The Feathered World*, giving as concisely as possible the points that he wishes to be enlightened upon, will always receive attention under "Answers to Correspondents" in that paper.

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